

Personal Travel The Long and the Short of It



ISSUES INVOLVED IN
ANALYSIS USING THE NPTS AND THE ATS

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1.0 Overview of the Surveys

1.1 Nationwide Personal Transportation Survey (NPTS)

The Nationwide Personal Transportation Survey (NPTS) is a survey of typical daily travel performed by people in households all over the United States. The travel survey is conducted every five to seven years by the United States Department of Transportation (U.S. DOT), and collects information about trips by all modes of transportation. It is the only authoritative source of national data on the amount and nature of daily personal travel, and the only source that allows us to assess how travel has changed in the nation as a whole. The 1995 survey is the fifth in a series that began in 1969, and was continued in 1977, 1983, and 1990.

The 1995 NPTS incorporated state-of-the-practice survey methods, including pre-notification letters, telephone recruiting, provision of travel diaries for tracking respondent's daily trips, and computer aided telephone interviewing (CATI) to aid in the collection of the data. The 1995 survey was conducted seven days a week, including all holidays, from May 1995 to July 1996. Survey data were collected from a sample of 42,033 households including 95,360 people making over 400,000 daily trips. Both urban and rural areas were included.

All trips made during a pre-assigned 24-hour travel day by each household member five years of age and over in the sampled household were included in the survey. Details about the purpose of every trip, means of transportation, trip time and duration, number of household members and total number of people on the trip, driver and vehicle characteristics are included in the data set.

In addition, the data contains detail about household composition, vehicle ownership, and economic characteristics. Information about the people in the household, such as age, sex, relationship, and worker and student status was obtained. Vehicle characteristics collected in the survey include the make, model, age, and odometer readings for two time periods. The respondents were asked about long-distance trips and accidents within the preceding two-week period, and seat-belt use was probed. A customer satisfaction component was included to obtain information on a number of attitudinal questions concerning perceived congestion, and opinions about the transportation system.

The NPTS data are expanded to provide annual, national estimates of trips and miles traveled by mode, purpose, time of day, day of week, and a host of other mobility characteristics which are analyzed to describe the human, economic, and environmental impacts of personal transportation in the U.S. The 1995 data are the most comprehensive in the NPTS series, since a travel diary was used to get a more complete accounting of daily trips whereas previous surveys depended on the recall method. Just over four trips a day per person, or one billion trips per day for the U.S. population are represented in the database.

The data files also include information about longer distance travel in the Travel Period file. The

travel period and the travel day sections of the questionnaire were designed to complement each other. In the travel day section, the respondent is asked to report all trips of any length during the 24-hour travel day--an assigned sample day that is the same for all members of the household. The travel day is designed to collect the types of trips people make on a daily basis, such as to the store, to work, running errands, and visiting friends.

Because people make longer trips less frequently, respondents are asked to report any trips of 75 miles or more one-way, taken over the two-week period preceding the travel day. Once the travel day is established, the travel period becomes the thirteen days prior to the travel day, plus the travel day itself. Because the travel day is also included in the travel period, if the respondent took a long trip on the travel day, this would be reported in both sections of the travel questionnaire.

1.2 American Travel Survey

The American Travel Survey (ATS) was conducted for the Bureau of Transportation Statistics by the U.S. Bureau of the Census. The previous ATS, conducted in 1977 as a component of the Census of Transportation. The 1995 American Travel Survey contains information on the origin, destination, volume, and characteristics, of long distance trips (where the destination is 100 miles away from home or more) made by residents of the United States. The data provide insight into American's long-distance transportation choices, including foreign and domestic travel.

Approximately 80,000 households nationwide were selected to participate in the survey, and over 65,000 households completed all four interviews. The survey consisted of four detailed interviews conducted approximately every three months from April 1995 to March 1996. In most cases, one adult household member provided information for all household members. These interviews were conducted primarily by telephone, with in-person interviews of some respondents who could not be reached by telephone. Approximately 250,000 household interviews are included in the file.

Sampled households received a notification letter followed by a survey packet and a telephone call in early January 1995. The telephone call described the importance of the survey, encouraged participation, explained what household members needed to do to record their travel during the subsequent three months, and answered questions. The survey packet contained information about the survey, a travel map, and a travel calendar.

The survey gathered demographic characteristics of all household members and information about trips to destinations 75 miles or more from their homes taken during 1995. The 75 miles was established as a method to ensure trips of 100 miles or more were completely obtained. Post-processing independently established the trip distance and edited out the trips of less than 100 miles. Trip characteristics included such items as the origin and destination, the principal means of transportation, the reason for travel, the access and egress modes to airports, train, and bus stations, and information about the travel party. Travel and tourism information was also

collected, including the number of nights spent away from home, and the type of lodging.

2.0 Comparison of Survey Methodology

| Comparison of NPTS and ATS | | |
|----------------------------|--|---|
| | NPTS | ATS |
| What is the Universe? | Trips made by civilian, non-institutionalized persons living in households (not group quarters) who are aged five and older. Student dormitories were not included in the sample. | Trips to destinations 100 miles or more away made by civilian, non-institutionalized persons of all ages. College dormitories and housing were included in the sample of households. Excluded were: <ul style="list-style-type: none"> ◆ trips made by crews of train, planes, bus or ship ◆ regular commuting to work or school ◆ one-way trips to move to a new residence ◆ trips by members of the Armed Forces while on active duty |
| What was the sample? | List-assisted telephone number sample. The sample frame was constructed using valid residential area code/telephone exchange codes for the fifty states and the District of Columbia. The sample frame was further stratified by: <ul style="list-style-type: none"> ■ geography ■ Metropolitan area status ■ the presence of a subway or elevated rail system ■ the density of listed telephone numbers | Retired Census current population survey (CPS) address samples. People whose usual place of residence was located at the address during April formed the basic sample of households interviewed. The multi-stage sampling procedures selected a sample of census enumeration districts, and within each selected district, a cluster of household units. The sample size was approximately the same for each state to minimize sampling error for state-level data. |
| Type of Interviewing? | The NPTS used computer-aided telephone interviewing (CATI), including a roster of household member's trips to | The ATS primarily used telephone interviewing and conducted in-person interviews with some |

| Comparison of NPTS and ATS | | |
|-----------------------------|--|--|
| | confirm trips taken with other household members and automatic checks on data ranges and logic. | respondents who could not be reached by telephone. |
| Mail-out Packet? | The NPTS used a pre-notification letter, followed by a recruiting call and a mail-out packet of travel diaries for each household member (5 yrs and older). | The ATS used a notification letter and a recruiting call, followed by a packet containing a travel map and a calendar for use as a memory jogger (the respondent was to note long-distance trips on the calendar). |
| Survey Period? | The NPTS was conducted from May 1995 through June 1996. The survey was conducted over a one-year period so that seasonal variations in travel are represented. | The ATS consisted of four detailed interviews conducted approximately every three months from April 1995 to March 1996. |
| Sample period? | The travel day was assigned to each sampled household. All members reported trips made on the same day. The travel day was from 4:00 AM of the sample day to 3:59 AM of the following day. The longer-distance (Travel Period) trips were collected for the preceding two-week period which ended on the travel day. | The data was collected using a 3-month recall period, therefore the file represents trips which began during the calendar year of 1995 (January 1 through December 31). |
| What is a completed survey? | A household was considered complete when half of the adult members or more listed their daily trips (either in an interview or by proxy) | A household was considered complete if one adult household member provided information for all household members |
| Interview time? | Interviews with the sampled household were completed | Each sampled household was interviewed at approximately |

| Comparison of NPTS and ATS | | |
|----------------------------|--|--|
| | within 6 days of the assigned travel day or the household was dropped from the sample. | 3-month intervals about their long-distance travel. |
| Imputation? | Data for missing values is coded as missing. | Values for missing data are estimated through imputation procedures. Imputed data are flagged. |

2.1 Reliability of the Data

The data collected in both surveys are estimates derived from samples. The estimation procedure for each survey inflates the unweighted sample results to independent estimates of the total population of the United States. Since these data come from samples, they are subject to sampling error. Sampling error results because each particular sample used for these surveys is one of a large number of possible samples that could have been selected using the same sample designs. Even if all interviewing conditions were the same, estimates from each of the samples would differ from each other by an amount we refer to as sampling error.

The standard error is used to measure the sampling error. The standard error also partially reflects the variation in the estimates due to some nonsampling errors (see below) but does not measure any systematic bias in the data.

The accuracy of the survey estimates depend on both sampling and nonsampling errors, but the full extent of the nonsampling error is not known, whereas sampling error can be computed and considered in the analysis. In order to compute correct estimates of the sampling error, it is necessary to use techniques that take into account the complex sample designs of the surveys. Sampling error estimates for the NPTS can be computed using a computer software program (such as SUDAAN) that uses a Taylor-series linearization method.

Another method of estimating sampling error is by using replicate weights. Replicate weights were computed for the ATS and are available to the data analyst upon request. Replicate weights for the ATS were computed using the Fay method with a “Cap K” value 0.5. One can estimate sampling errors for the ATS data using a computer software program (such as WesVar) that employs the replication method.

3.0 Issues in Data Definitions

A number of differences exist between the two surveys in the definitions of basic data items. This section outlines some of those issues. This is not a comprehensive list of all of the differences in definition, nor is it meant to be. More similarities and differences will be found as research using the two surveys commences.

For instance, the ATS and the NPTS Travel Period both include foreign travel. The trip records are included in the NPTS Travel Period, however trip mile estimates are not. The ATS has foreign trips included in the database, but they can be removed for comparative analysis.

3.1 Household Definition

The ATS includes information about trips made by all persons in the household, regardless of age. The NPTS contains trips made by household members aged 5 or over.

The NPTS daily travel data files include a household file, which describes characteristics of the household and contains a list of all household members, regardless of age or travel. The Person file contains the data about all interviewed people, and the day trip file has one record describing every trip made by every person who traveled on the sample day. The day trip file contains a variable “overlap” which identifies trips that are also part of the Travel Period database.

The ATS long-distance travel files include a household-trip file and a person-trip file. The household trip data includes information about the number of people in the household for which travel is obtained, total household and family income, household type, and number of vehicles. Information on person trips includes such variables as the traveler’s age, race, origin, income category and activity. Trips variables on both the household-trip and person-trip files include purpose of the trip, mode of transportation, trip distance, number of household members on the trip, and other descriptions of the trip.

The travel party size was categorized into one of three groups in the ATS, based on whether household and/or non-household members were on the trip. These categories include:

Travel Party - the total number of household and non-household members on the trip.

Household Travel Party - the total number of household members on the trip.

Non-Household Travel Party - the total number of non-household members on the trip.

In the NPTS the respondent was asked if anyone was with him or her on the trip, which household members and the number of non-household members. These data are summed for a total count of people on the trip (numontrp), and also separately coded. The specific identity of the household members are also separately coded for analysis.

3.2 Trip Definition

A trip in the ATS is defined as a “household trip”, that is, a round trip to a place at least 100 miles away from home and a return on which one or more members of the household traveled together. A person trip is a trip taken by an individual. For instance, if three people from the same household traveled together, they would have taken one (household) trip and three person trips. If one individual took three different trips during the year, he or she would have taken three (household) trips and three person trips.

Trips in the American Travel Survey are round trips in the database. A leg of a journey to- or from- a destination may be less than 100 miles. The round trips can be split into two one-way trips (O-D, D-O) for one-way trip analysis.

The NPTS Travel Period trips are round trips, collected for trips of 75 miles or more. The definition was a trip of 75 miles or more from which the respondent returned home during the two-week period leading up to the sample day. The question was asked of all interviewed members of the household.

Trips in the NPTS Travel Day file are one-way segments of travel. Each stop made for a distinct purpose ends a trip.

Each trip in the ATS was classified as a weekend trip or not a weekend trip. Travelers who stayed one or two nights away including a Friday and/or Saturday night are defined as regular weekend travelers. Those who stayed three to five nights away including a Friday or Saturday night are defined as long weekend travelers.

3.3 Calculation of Distance Traveled

ATS trip lengths were calculated by Oak Ridge National Laboratories (ORNL), based on origin-destination pairs and mode of transportation. ORNL employed a computer model of the Nation’s highways, railroads, and air-routes to compute “route” distances based on the ZIP code centroids of each trip origin and destination and additional information about stops provided by respondents. Great Circle Distance (the shortest distance between two points on the face of the globe) was also calculated and provided on the data files. Remember that the respondents were asked about trips of 75 miles and more to ensure a complete accounting of trips of 100 miles and more. Trips below 100 miles in distance were not included in the database.

The NPTS Travel Day data include the respondent’s estimate of distance for the trip (“How far is it from where you started to ____[destination name]”). The time and distance responses were checked for logical speeds by the CATI system. Therefore, all trip distances are a self-estimate.

The trip lengths listed in the variable “Calc_dist” in the NPTS Travel Period were calculated based on origin-destination distance from MSA centroid to MSA centroid. To make this distance

more comparable to ATS, a circuitry factor of 1.22 can be applied.

3.4 Person Miles

In the ATS ‘person miles’ is an estimate of the aggregate distance traveled by all persons who took a trip and is based on the calculated transportation network miles traveled on a trip.

In the NPTS daily travel file distance of the trip is collected along with other information about each trip from the respondent. ‘Person miles’ is the calculation of the distance multiplied by the number of people on the trip.

3.5 Mode of Travel

The American Travel Survey defined the mode of travel as the principal means of transportation used for the greatest distance from origin to destination. The major types of modes are:

- Personal Use Vehicle. Any trip in which the main type of transportation used to cover most of the miles on that trip was a car, pick-up, van, recreational vehicle or motor home, or motorcycle/moped. This term includes all rental cars, trucks, and vans.
- Airplane. Any trip in which the principal means of transportation was a commercial airplane or corporate or personal airplane.
- Bus. Any trip in which the principal means of transportation was intercity bus, charter or tour bus, or school bus.

The mode detail in the file of daily travel (NPTS) is similar, but not precisely the same. For instance, the mode categories for daily travel do not separate rental cars from any other private auto. Attachment 1 shows one possible way in which the ATS and NPTS categories for mode of travel can be grouped to be comparable

3.6 Purpose of Travel

The American Travel Survey asked respondents to indicate the main reason (motive) for the travel. The major categories are:

- Business Trip. Any trip where the purpose of the trip is given as business, combined business with pleasure, or convention, conference or seminar.
- Pleasure Trip. Any trip where the purpose of the trip is given as visiting friends or relatives, rest or relaxation, sightseeing, outdoor recreation, entertainment, or shopping.
- Leisure Trip. Any trip where the purpose of the trip is given as rest or relaxation, sightseeing, outdoor recreation, entertainment or shopping.

- **Personal Business Trip.** Any trip where the purpose of the trip is given as school-related activity or personal or family business including weddings and funerals.

The NPTS daily travel file uses a from-to format (variables “WHYFROM” and “WHYTO” are present for each record), including using a separate purpose for returning home. In a round-trip format, the trip to and the trip from the workplace would be classified as a work trip. The purpose of travel in the day trip file is coded into 17 separate detailed purposes, generally covering four overall purposes:

- **Family and Personal Business.** This is the most prevalent trip purpose in NPTS, and includes trips for shopping, running errands, and dropping off and picking up others.
- **Social and Recreational.** This is the next most common reason for daily travel, and includes visiting friends and relatives as well as other social and recreational trips.
- **Commuting and Work-Related Travel.** About one out of five trips are directly to work or for work-related travel.

The NPTS Travel Period file uses the same 17 codes for the purpose of travel. The most common purpose for the long-distance trips is to visit friends and relatives, followed by social/recreational travel, and third most frequent is work-related business. Attachment 2 shows one possible way in which the ATS and NPTS purpose codes can be grouped to be comparable.

4.0 Control Totals for Basic Data Items

The weights on the data files for all surveys raise the sampled trip to represent an annualized estimate. The household and person files are weighted to represent the total population. Because of the complex sample structure, which was very different for each survey, the weighted data must be used. In the NPTS, there were areas of the country that paid for additional samples (called ‘add-ons’) to be collected. The weights carried on each record correctly account for these over-sampled areas. In the ATS, the sample size was calculated for each state to allow state-level estimates.

| Control Totals for NPTS and ATS Basic Data Items | | | | | | |
|--|-------------|-------------------|--------------------|-----------------|-----------------|------------------------------|
| Variable | ATS | | NPTS Travel Period | | NPTS Travel Day | |
| | N | Weighted | N | Weighted | N | Weighted |
| House holds | 65,000 | 98,990,000 | 42,033 | 98,990,000 | 42,033 | 98,990,000 |
| Persons (5 and older) | | 245,998,000 | 95,360 | 241,675,000 | 95,360 | 241,675,000 |
| All Persons | | 265,284,000 | -- | 259,993,542 | -- | 259,993,542 ¹ |
| Person Trips | 556,026 | 1,042,615,157 | 29,647 | 1,996,178,135 | 409,025 | 378,930,363,336 ² |
| Person Miles | 527,077,679 | 1,040,706,500,000 | 8,177,818 | 530,438,381,743 | 402,298 | 3,411,121,810,000 |
| Vehicle Trips | 259,133 | 511,950,320 | 17,860 | 1,198,992,148 | 250,181 | 229,745,329,785 |
| Vehicle Miles | 141,886,966 | 287,161,584,267 | 3,500,006 | 235,458,013,584 | 248,407 | 2,068,368,000,000 |

5.0 Other Issues

Special procedures must be followed for adding the data from travel period and travel day from the NPTS. If the respondent took a trip of 75 miles or more and returned home on the assigned travel day, that trip will be collected in both the travel day and the travel period sections of the questionnaire. Remember that, for travel period trips, it does not matter when the outgoing portion of the trip took place, however the trip to return home must have been made during the two-week travel period (the fourteen days immediately prior to the travel day).

Because of the differences in the definition of the travel period trips and the travel day trips, it is possible that one trip on the travel period file could be counted as several trips on the travel day file. The variable "OVERLAP" identifies which travel day trips are also carried on the travel period file. To run a combined estimate, run the travel day file omitting the OVERLAP trips, and

¹This number is derived from 241,675,000 persons age 5 and over plus 18,318,542 persons 0 to 4 years, as found in the household variable HH_0to4

²The NPTS Travel Day trips are one-way segments of travel.

combine that result with all trips from the travel period file.

6.0 More Information

For more information about the 1995 Nationwide Personal Transportation Survey, contact the Federal Highway Administration at:

Federal Highway Administration
Office of Highway Information Management
400 7th Street, SW
Washington, DC 20590
NPTS@fhwa.dot.gov

Or visit the website at:

<http://www-cta.ornl.gov/npts/>

For more information about the American Travel Survey (ATS), contact the Bureau of Transportation Statistics at:

Bureau of Transportation Statistics
U.S. Department of Transportation
400 Seventh Street, S.W. Suite 3430
Washington, DC 20590
ATS@bts.gov

Or visit the website at:

<http://www.bts.gov/programs/ats>

ATTACHMENT 1

| Common Coding Conventions for Mode | | | | |
|------------------------------------|------|----------------|-------|--------------------------|
| Common Codes | NPTS | | ATS | |
| New Description | Code | Description | Code | Description |
| POV | 01 | Auto | 01 | Car, Truck or Van |
| | 02 | Van | 02 | Other Truck |
| | 03 | SUV | 03 | Rental Car, Truck or Van |
| | 04 | Pick-Up | 17 | Motorcycle |
| | 05 | Other Truck | | |
| | 06 | RV | | |
| | 07 | Motorcycle | | |
| | 08 | Other POV | | |
| Transit | 09 | Bus | | |
| | 11 | Commuter Train | | |
| | 12 | Streetcar | | |
| | 13 | Subway | | |
| School Bus | 18 | School Bus | 08 | School Bus |
| Intercity Bus | | | 06 | Intercity Bus |
| | | | 07 | Charter or Tour Bus |
| Intercity Rail | 10 | Amtrak | 09 | Train |
| Air | 14 | Airplane | 04/05 | Air |
| Walk | 17 | Walk | | |
| Other | 15 | Taxicab | 10 | Taxi |
| | 16 | Bicycle | 16 | Bicycle |
| | 19 | Other non-POV | 15 | RV |

| Common Coding Conventions for Mode | | | | |
|------------------------------------|--|--|-----------------|------------------------|
| | | | 11/12/ 13/14 | Ship, Ferry, Boat, etc |
| | | | 18 | Other |

| Common Coding Conventions for Purpose | | | | |
|---------------------------------------|-------|---------------------------------|------|-----------------------------|
| Common Codes | NPTS | | ATS | |
| New Description | Code | Description | Code | Description |
| Commuting | 01 | To Work | | |
| Business | 02 | Work-Related Business | 01 | Business |
| | 03 | Return to Work | 02 | Combined Business/Pleasure |
| Visit Friends and Relatives | 12 | Visit Friends | 05 | Visit Friends and Relatives |
| Personal Business | 04 | Shopping | 04 | School-Related |
| | 05 | School | 10 | Shopping |
| | 06 | Church | 11 | Personal/Family |
| | 07 | Medical/Dental | | |
| | 08 | Other Family/Personal | | |
| | 09/10 | Pick-up or Drop-off a Passenger | | |
| Leisure | 11 | Vacation | 06 | Rest/Relaxation |
| | 13 | Eat Out | 07 | Sightseeing |
| | 14 | Other Social/Recreational | 08 | Outdoor Recreation |
| | | | 09 | Entertainment |
| Other | 6 | Other | 12 | Other |

***The NPTS has a purpose code (17) describing a trip to “Go Home”. Analysis of these trips

will need to be coded according to the origin purpose.